

*Missouri valley.*—2d, 4th, 5th, 8th.

*Northern slope.*—6th.

*Middle slope.*—1st, 5th, 7th.

*Southern plateau.*—1st, 4th.

*Middle plateau.*—3d, 5th, 7th, 8th.

*North Pacific coast region.*—4th, 5th, 7th, 8th.

*Middle Pacific coast region.*—2d, 11th.

*South Pacific coast region.*—2d.

#### MIRAGE.

Mr. D. F. G. Crawford, of Allegheny City, Pennsylvania, reports that, on June 11th, the flames from the McGuigan natural-gas well, sixteen miles distant, were distinctly visible in two places. Between the natural-gas well and Allegheny City, intervenes a hill, at least two hundred and fifty feet in height, and ordinarily only a faint glow from the flame is observed. A similar phenomenon was observed at this place, March 16th, 1884.

Fort Macon, North Carolina: at 8.45 a. m. of the 13th the image of a group of trees north of this station appeared to be elevated 15° above the horizon.

Point Judith, Rhode Island: from 5.30 p. m. until after sunset on the 16th, Block Island, with its inverted image above it, appeared several miles nearer than its actual distance from this place. The smoke from the steamers on the sound settled in a narrow band parallel to the horizon and at the same altitude as the inverted image of the island. Vessels to the south-westward appeared twice their actual height—the topmasts meeting the band of smoke above mentioned.

New London, Connecticut: from 6.30 to 7.20 p. m. of the 23d, the images of several vessels beyond the horizon were observed (not inverted) at an altitude of 15°.

Mirage was also observed at the following places:

Indianola, Texas, 4th, 6th.

Galveston, Texas, 5th.

Salina, Kansas, 14th, 25th.

#### MISCELLANEOUS PHENOMENA.

##### SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service stations. Reports from one hundred and sixty stations show 4,765 observations to have been made, of which two were reported doubtful; of the remainder, 4,763, there were 3,936, or 82.6 per cent., followed by the expected weather.

##### SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for June, 1884:

Date— June, 1884.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 6 p. m....	0	0	0	10†	0	0	8	30†	
2, 12 m.....	1	15†	0	0	1	15†	9	50†	
4, 10 a. m....	0	0	5	20†	0	0	4	30†	
5, 9 a. m....	1	3	0	0	1	3	5	35†	
6, 10 a. m....	0	0	0	0	0	0	5	35†	
7, 1 p. m....	0	0	0	0	0	0	5	40†	
8, 4 p. m....	1	10†	0	0	0	0	6	50†	
9, 3 p. m....	1	1	0	0	1	1	7	30†	
13, 11 a. m....	4	10†	0	0	0	0	8	15†	
14, 11 a. m....	1	1	0	0	1	1	7	10†	
15, 11 a. m....	0	0	0	0	0	0	5	7	
16, 4 p. m....	1	5†	1	1	1	1	6	12†	
17, 5 p. m....	1	2	0	0	1	2	7	14†	
18, 6 p. m....	0	0	0	0	0	0	5	15†	
20, 2 p. m....	1	5†	0	0	0	0	6	20†	
21, 4 p. m....	0	5	0	0	0	0	6	25†	
22, 5 p. m....	0	0	0	0	0	0	5	20†	
23, 12 m.....	1	1	0	0	1	1	6	20†	
24, 3 p. m....	0	0	1	2	0	0	4	10	
26, 4 p. m....	2	7	0	2	2	7	4	15	
27, 5 p. m....	2	3	0	2	2	3	7	15†	
28, 6 p. m....	0	0	1	5	0	0	5	12†	
29, 5 p. m....	0	10†	0	0	0	0	5	25†	
30, 4 p. m....	0	15†	0	0	0	0	5	40†	Faculae abundant.

Faculae were seen at the time of every observation. †Approximated.

Mr. William Dawson, of Spiceland, Henry county, Indiana, furnishes the following record of sun spots for June, 1884:

Date.	Hour of observation.	Number of groups.	Number of spots.	Remarks.
1st.....	9.15 a. m....	5	53	
2d.....	8.20 a. m....	5	60	
4th.....	8.15 a. m....	5	40	
5th.....	8.15 a. m....	5	60	
7th.....	4.20 p. m....	5	37	
13th.....	7.40 a. m....	3	12	
15th.....	9.45 a. m....	3	6	
17th.....	8.40 a. m....	5	21	
18th.....	8.40 a. m....	6	45	
19th.....	8.00 a. m....	5	25	
21st.....	8.00 a. m....	5	47	
22d.....	5.00 a. m....	5	47	
23d.....	8.20 a. m....	4	36	
27th.....	9.00 a. m....	5	20	
28th.....	8.00 a. m....	5	23	
30th.....	8.15 a. m....	5	40	

#### DROUGHT.

*Arkansas.*—Lead Hill, Boone county: although the rainfall for June at this place was 3.60 inches, the rains were remarkably local, and in surrounding localities drought prevailed.

*Connecticut.*—Hartford: no rain fell during the first eleven days of the month; on the 12th and 13th two very light showers fell; after these dates there was no rain until the storm of the 25th and 26th, which was accompanied by heavy rain. During the first and second decades of the month the drought was very severe and caused great damage to vegetation, especially to the hay crop.

New Haven, 24th: rain is seriously needed in the farming districts of this state. It is reported that the condition of the grass crop indicates that the yield will be the lightest for many years past. The apple crop is also seriously affected, the trees being injured by canker worms. The drought was terminated by the heavy rains of the 25th and 26th.

*Michigan.*—Port Huron, 8th: the weather is very warm and dry, and vegetation is badly parched; rain is much needed in this section.

*New York.*—Westchester, Westchester county, 22d: the farmers in this vicinity state that all crops, especially potatoes and corn, are suffering for rain.

*North Carolina.*—Scott's Hill, Pender county: reports from the surrounding country on the 19th and 20th stated that crops were suffering in consequence of drought. A much needed and abundant rainfall occurred on the 27th.

*Pennsylvania.*—Erie: the heavy rains of the 10th were of great benefit to the grass crop in this region which, before the above date, was suffering from drought.

*Texas.*—Rio Grande City, 24th: the soil is very dry and hard and all vegetation is much burned by the extremely hot and dry weather; there is also an insufficient supply of water for stock.

*Virginia.*—Johnsontown, Northampton county: from May 20th to June 24th, the total rainfall was only 0.15 inch; as a result, one of the severest droughts prevailed that has ever been experienced in this country.

#### METEORS.

Fort Gaston, California: a brilliant meteor, apparently of about 30' diameter, was observed in the north-northwestern sky at 8.15 p. m. of the 1st. The whole sky was illuminated as if by a flash of lightning; there were two visible explosions.

Lynchburg, Virginia: at 9.04 p. m. of the 23d a very large meteor was observed moving rapidly northward; it exploded when about 10° above the horizon. During its flight a whizzing noise was heard but no report was heard at its explosion. At about the same hour a meteor (probably the same) of this description was observed at Staunton, Virginia.

The following reports probably refer to the same meteor:

Variety Mills, Nelson county, Virginia: a brilliant meteor was observed at about 9.10 p. m. on the 23d. It started in the southwestern sky about midway between the horizon and zenith,

moved northwestward, and disappeared when about 20° above the northern horizon. Its colors were blue, red, and green, and throughout its course it emitted bright sparks. Before disappearing it exploded, but no noise was heard.

Cape Henry, Virginia: a large meteor of greenish tinge was observed at 9.30 p. m. of the 23d.

Meteors were also observed at the following places:

Indianola, Texas, 24th.  
Burlington, Iowa, 18th.  
Prescott, Arizona, 22d.  
Archer, Florida, 9th, 12th.  
Vevay, Indiana, 16th, 21st, 22d.  
Liberty Hill, Arkansas, 12th, 20th, 24th.  
Woodstock, Maryland, 15th, 16th.  
Tecumseh, Nebraska, 2d.  
Menand Station (near Albany), New York, 29th.  
Chapel Hill, North Carolina, 23d.  
Clarksville, Texas, 30th.  
Woodstock, Vermont, 17th.  
Madison, Wisconsin, 29th.  
Yutan, Nebraska, 25th.

#### EARTHQUAKES.

Red Bluff, California: two light shocks of earthquake were felt at 1 a. m. of the 6th; they were each of about one second's duration and separated by an interval of three or four seconds. The shock caused the wall of a two-story brick building to crack; the direction of the vibration was from east to west.

Los Angeles, California: an earthquake shock was felt at 10.48 a. m. of the 16th; the vibrations were from north to south, and were of about two second's duration.

Captain C. F. Swan, commanding the ship "City of Brooklyn," at San Francisco, California, June 14th, reports that at 8.43 a. m. of the 12th, in N. 40° 24', W. 125° 50', experienced a heavy shock, supposed to have been that of an earthquake, which caused the vessel to shake as though she had struck a reef.

#### WATER SPOUTS.

Key West, Florida: soon after 5 p. m. of the 12th three water spouts were observed near the light house, seven miles northwest of this island. Other spouts formed rapidly until nine were visible at one time. They remained in sight for nearly twenty minutes, meanwhile moving rapidly southward for a distance of about four miles, and then returned and were dissipated at or near the point where they were first seen, describing in their course a parabolic curve. Eight of the water spouts were perfectly formed and one was only partially formed; one was very large, its diameter being estimated at thirty feet. They did not approach sufficiently near to this station to be heard.

#### POLAR BANDS.

Lead Hill, Arkansas, 2d, 10th, 12th, 28th.  
Los Angeles, California, 24th, 29th.  
Archer, Florida, 3d, 11th, 15th, 20th, 26th, 30th.  
Fort Reno, Indian Territory, 4th.  
Salina, Kansas, 13th, 19th, 24th, 28th.  
Gardiner, Maine, 15th, 16th.  
Somerset, Massachusetts, 13th, 14th.  
Yutan, Nebraska, 10th, 17th, 21st.  
Mountainville, New York, 7th, 14th, 26th.  
Leetsdale and Pittsburg, Pennsylvania, 26th.  
Providence, Rhode Island, 13th, 15th.  
Stateburg, South Carolina, 22d.  
Nashville, Tennessee, 1st, 2d.  
Rio Grande City, Texas, 8th, 12th.  
Woodstock, Vermont, 19th, 21st.  
Wytheville, Virginia, 4th.

#### INSECTS.

Red Bluff, California: on the 20th it was reported that grasshoppers were appearing in large numbers and were causing considerable damage west of this station.

Salt Lake City, Utah, 30th: during the month swarms of a species of caterpillar made their appearance and caused considerable damage to the orchards in this vicinity and in the settlements lying north and south. At the close of the month they had not entirely disappeared.

#### ZODIACAL LIGHT.

Los Angeles, California, 23d, 25th.  
Pensacola, Florida, 12th.  
Indianapolis, Indiana, 18th.  
Manchester, Iowa, 11th, 12th, 14th.  
Monticello, Iowa, 29th.  
Elk Falls, Kansas, 14th.  
Fall River, Massachusetts, 16th, 18th.  
Nashville, Tennessee, 18th, 20th, 21st.

#### PRAIRIE AND FOREST FIRES.

Fort Buford, Dakota, 9th, 10th.  
Manistique, Michigan, 27th, 28th.  
Fort Benton, Montana, 17th, 18th.  
Portland, Oregon, 24th.  
Indianola, Texas, 2d.  
Cape Henry, Virginia, 4th.

#### SAND STORMS.

Fort McDowell, Arizona, 3d.  
Fort Reno, Indian Territory, 4th.  
Yuma, Arizona, 22d.

#### NOTES AND EXTRACTS.

REPORT OF THE ALABAMA WEATHER SERVICE, UNDER DIRECTION OF PROFESSOR P. H. SNELL, JR.

AGRICULTURAL AND MECHANICAL COLLEGE.

AUBURN, ALABAMA, July 1, 1884.

The dry weather of May has been followed in June by an almost constant precipitation. The first three days of the month were dry over the whole state, but from the 4th to the 16th, inclusive, the rainfall was almost continuous. The 17th, 18th, 19th, 20th, and 21st, were bright days, with but little rain at any point in the state. The remainder of the month was cloudy and showery. The farmers were able during May to clean their crops and put them in order for the rains that usually follow in June, but the rains have been so general during the past thirty days that the grass has regained its foothold and much work will be required to eradicate it and place the crops again in a favorable condition.

The first three days of June were cool, rendering fires comfortable, and the rays of the sun not unpleasant. The sky was generally clear, but the prevailing direction of the wind was from the east and southeast. On the 4th, the temperature began to rise and the winds became variable. Upon the 9th another cool wave passed over the state with winds from the northeast and northwest, and frequent occurrence of violent electrical storms from the west and northwest. Thick clothing and fires were again in demand. On the 17th, the temperature again increased with the wind from the east and southeast. The 21st and 22d, were the warmest days of the month. From this time until the close of the month, the thermometer gave high readings, with winds more or less variable.

#### State Summary.

Mean temperature 74° 6'; highest temperature, 100° at Calera, on the 21st; lowest temperature, 45° at Selma, on the 1st; monthly range of temperature for the state, 55°; greatest monthly ranges at stations, 40° at Gadsden, and 52° at Calera; least monthly ranges at stations, 20° at Tuscaloosa, and 31° at Auburn; greatest daily ranges of temperature, 45° at Calera, 33° at Selma, and 32° at Gadsden, all on the 1st; least daily ranges of temperature, 0° at Dadeville on the 10th (the thermometer standing at 72° all day), 1° at Tuscaloosa on the 10th, 1° at Clanton on the 3d, 1° at Marion and Greensborough on the 15th, 4° at Pineapple on the 22d, 4° at Green Springs on the 4th and 30th.

Mean depth of rainfall, 7.25 inches; mean daily rainfall, 0.26 inch; greatest monthly rainfalls: 15.65 inches at Clantonville, 12.94 inches at Clanton, 11.52 inches at Auburn; least monthly rainfalls: 3.15 inches at Evergreen, and 3.96 inches at Florence; greatest daily rainfall, average for the state, 0.97 inch on the 30th; heaviest daily rainfalls: 5.07 inches at Clantonville on the 16th, 4.00 inches at Auburn on the 28th, 3.62 inches at Montgomery on the 30th; Dadeville reports 1.75 inches in twenty-two minutes on the 30th; days of general rainfall, from the 4th to 16th, and from the 22d to 30th.

Average number of days on which rain fell, 15; average number of cloudy days, 16; fair days, 10; clear days, 4.

Warmest days, 21st and 22d; coldest days, 1st and 11th.

Prevailing direction of the wind, east and southeast; greatest force of wind reported from Florence on the 9th—40 miles per hour from the southwest; all stations reported heavy winds on the 9th; Montgomery reports, on the 13th, 28 miles per hour from the north.